

1 **A CAPTIVE COVER FOR A HYPODERMIC NEEDLE OF AN**
2 **INTRAVENOUS (IV) TUBE ASSEMBLY**

3 **BACKGROUND OF THE INVENTION**

4 **1. Field of the Invention**

5 The present invention relates to a safety device, and more particularly to
6 a captive cover for a hypodermic needle of an intravenous (IV) tube assembly.

7 **2. Description of Related Art**

8 Since some patients cannot ingest nutrients or medicine orally, nutrients
9 or medicine must be administered intravenously from an IV solution container.
10 A conventional IV solution container must have an IV tube assembly to connect
11 the IV solution container to a patient.

12 The IV tube assembly comprises a container needle, an upper IV tube, a
13 lower IV tube, an injection joint, a flow control apparatus and a hypodermic
14 needle. The upper IV tube and the lower IV tube respectively have upper ends
15 and lower ends. The container needle is connected to the upper end of the upper
16 IV tube and is inserted into the IV solution container. The injection joint
17 comprises an intermediate container and a lid. The intermediate container has a
18 bottom, an open top and a discharge outlet. The discharge outlet is formed on the
19 bottom of the intermediate container and is connected to the upper end of the
20 lower IV tube. The lid is mounted securely on the open top of the intermediate
21 container. The lower end of the upper IV tube is connected to the lid. The flow
22 control apparatus is mounted around the lower IV tube to control how quickly an
23 IV solution is administered to a patient. The hypodermic needle is connected to
24 the lower end of the lower IV tube and is inserted into a patient's vein so the IV

1 solution can be administered to a patient.

2 A conventional hypodermic needle has a cover to protect the
3 hypodermic needle. The cover is removed when the IV is administered to a
4 patient and replaced on the hypodermic needle when the administration of an IV
5 solution to the patient is complete. However, two problems exist with the small
6 conventional cover. First, the cover is easily lost between the time it is removed
7 from the needle and the time it needs to be replaced on the needle. This makes
8 the contaminated IV hypodermic needle a personnel hazard during the disposal
9 process. Second, the cover is small, and medical personnel are subject to
10 puncture injuries from the contaminated needle during the process of replacing
11 the cover over the hypodermic needle.

12 With reference to Figs. 7 and 8, a captive cover (40) disclosed in Taiwan
13 Patient No. 90221792 obviates the problem with loosing the cover, is formed
14 integrally with and extends from a flow control apparatus (not numbered) and
15 comprises a chamber (44) and an annular rib (45). The chamber (44) has a closed
16 distal end (not numbered) and an open proximal end (not numbered). The
17 annular rib (45) extends radially inward from the open proximal end of the
18 chamber (44). A hypodermic needle (7A) of an IV tube assembly has multiple
19 resilient locking tabs (71A) formed around the hypodermic needle (7A) of the IV
20 tube assembly. The hypodermic needle (7A) can be pushed into the chamber (44)
21 of the captive cover (40), which compresses the resilient locking tabs (71A) until
22 the locking tabs (71A) pass the annular rib (45) that securely holds the
23 hypodermic needle (7A) in the chamber (44) of the captive cover (40). The
24 captive cover (40) can prevent personnel injuries from the contaminated

1 hypodermic needle (7A) during the disposal process.

2 However, the hypodermic needle (7A) must be compatible with the
3 conventional captive cover (40) to provide the safety effect. The conventional
4 captive cover (40) is not compatible with ordinary hypodermic needles for the IV
5 tube assembly. Modification of conventional hypodermic needles to obtain
6 hypodermic needles (7A) compatible with the captive cover (40) will increase
7 the cost of the manufacturing. Furthermore, a significant amount of pressure is
8 required to push the locking tab (71A) of the hypodermic needle (7A) through
9 the annular rib (45) of the conventional captive cover (40). Since the
10 conventional captive cover (40) is suspended in the air with the IV tube assembly,
11 pressing the hypodermic needle (7A) into the captive cover (40) that will shake
12 and possibly dislodge the entire IV tube assembly.

13 **SUMMARY OF THE INVENTION**

14 The main objective of the present invention is to provide a captive cover
15 for a hypodermic needle of an IV tube assembly that has a simple structure and
16 allows the hypodermic needle of the IV tube assembly to be conveniently
17 inserted into the captive cover.

18 To achieve the objective, a captive cover is provided for a hypodermic
19 needle of an IV tube assembly, which has a needle and a needle hub, and
20 comprises an elongated body. The elongated body is formed or mounted on an
21 element of the IV tube assembly and has a proximal opening, a closed distal end,
22 a chamber and at least one locking tab. The hypodermic needle of the IV tube
23 assembly is inserted through the proximal opening into the chamber. The hub of
24 the hypodermic needle is held in the chamber by the locking tab so the

1 hypodermic needle cannot be pulled out of the captive cover. Since the
2 hypodermic needle of the IV tube assembly only passes by the locking tab of the
3 elongated body, the hypodermic needle of the IV tube assembly can be
4 conveniently inserted into the elongated body. The captive cover compatible
5 with ordinary conventional hypodermic needles, has a simple structure and costs
6 less to manufacture than the conventional captive cover.

7 Further benefits and advantages of the present invention will become
8 apparent after a careful reading of the detailed description with appropriate
9 reference to the accompanying drawings.

10 BRIEF DESCRIPTION OF THE DRAWINGS

11 Fig. 1 is a perspective view of a first embodiment of a captive cover for a
12 hypodermic needle of an IV tube assembly in accordance with the present
13 invention;

14 Fig. 2 is a cross sectional perspective view of the captive cover in Fig. 1
15 showing a hypodermic needle before being inserted in the captive cover;

16 Fig. 3 is a cross sectional side plan view of the captive cover in Fig. 1
17 with the hypodermic needle in the captive cover;

18 Fig. 4 is a perspective view of a second embodiment of a captive cover
19 for a hypodermic needle of an IV tube assembly in accordance with the present
20 invention;

21 Fig. 5 is a cross sectional exploded perspective view of the captive cover
22 in Fig. 4 showing the hypodermic needle before being inserted into the captive
23 cover;

24 Fig. 6 is a cross sectional side plan view of the captive cover in Fig. 4

1 with the hypodermic needle in the captive cover;

2 Fig. 7 is a cross sectional side plan view of a conventional captive cover
3 in accordance with the prior art showing the hypodermic needle before being
4 inserted into the captive cover; and

5 Fig. 8 is a cross sectional side plan view of the conventional captive
6 cover in Fig. 7 with the hypodermic needle in the captive cover.

7 DETAILED DESCRIPTION OF THE INVENTION

8 With reference to Figs. 1, 3, 4 and 5, a captive cover in accordance with
9 the present invention for a hypodermic needle of an intravenous (IV) tube
10 assembly with multiple elements including a container needle, an upper tube, a
11 lower tube, a flow control apparatus and a hypodermic needle comprises an
12 elongated body (12, 12') attached longitudinally to an element of the IV tube
13 assembly. The elongated body (12, 12') is hollow and has an outside surface (not
14 numbered), a proximal opening (14, 14'), a closed distal end (not numbered), a
15 chamber (13, 13'), at least one locking tab (16, 16') and one or more optional
16 connectors (18). The proximal opening (14, 14') is tapered inward. The chamber
17 (13, 13') is formed longitudinally in the elongated body (12, 12') between the
18 proximal opening (14, 14') and the closed distal end, communicates with the
19 tapered proximal opening (14, 14') and tapers slightly toward the closed distal
20 end. The at least one locking tab (16, 16') is resilient, is formed in the outside
21 surface near the proximal opening (14, 14') and protrudes into the chamber (13,
22 13') toward the distal end.

23 With reference to Figs. 1 and 2, a first embodiment of the captive cover
24 for a hypodermic needle of an IV tube assembly in accordance with the present

1 invention comprises an elongated body (12) formed longitudinally on an element
2 of the IV tube assembly. The elongated body (12) extends from the element of
3 the IV tube assembly. Preferably, the elongated body (12) is formed integrally
4 with and extends from a flow control apparatus (10). In the embodiment
5 described, the elongated body (12) has one locking tab (16).

6 With reference to Figs. 4 to 6, a second embodiment of a captive cover
7 for a hypodermic needle of an IV tube assembly in accordance with the present
8 invention further comprises an elongated body (12') and at least one connector
9 (18). In the second embodiment, the elongated body (12') has two locking tabs
10 (16'). The at least one connector (18) is formed integrally with and extends
11 radially from the elongated body (12'). Preferably, the captive cover has two
12 connectors (18) formed integrally with and extending radially respectively from
13 the distal end and near the proximal opening (14') of the elongated tube (12').
14 Preferably, the at least one connector (18) is a C-shaped resilient clip. The at least
15 one connector (18) is connected to an element of the IV tube assembly.
16 Preferably, the at least one connector (18) is connected to a container needle
17 (30).

18 With further reference to Fig. 3, a hypodermic needle of an IV tube
19 assembly has a needle hub (20) and a needle (not numbered). The needle hub (20)
20 has a proximal end (not numbered), a distal end (not numbered) and an annular
21 flange (21). In both the first and second embodiments of the captive cover, the
22 hypodermic needle of the IV tube assembly is inserted through the proximal
23 opening (14, 14') and into the chamber (13, 13') of the elongated body (12, 12'),
24 the annular flange (21) of the hypodermic needle (20) is held in the elongated

1 body (12, 12') by the locking tab(s) (16, 16').

2 The captive cover for the hypodermic needle of the IV tube assembly as
3 described is attached to an element of the IV tube assembly, and the hypodermic
4 needle can be conveniently inserted into the captive cover. Since the hypodermic
5 needle just passes through the one or more resilient locking tabs, the hypodermic
6 needle do not need a significant amount of pressure to pass through the one or
7 more locking tab. The captive cover can accommodate ordinary hypodermic
8 needles, has a simple structure and is cheaper than the conventional captive
9 cover.

10 Although the invention has been explained in relation to its preferred
11 embodiment, many other possible modifications and variations can be made
12 without departing from the spirit and scope of the invention as hereinafter
13 claimed.